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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT PAPER NUMBER

2827

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/075,513

Applicant(s)

CHIU, CHIA-PIN

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-7,9-11,13-15 and 26-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-7,9-11,13-15 and 26-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 May 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The corrected or substitute drawings were received on May 6, 2003. These drawings are approved.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2, 4, 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsukahara, US Patent No. 6,531,022.

Regarding claim 1 Tsukahara discloses an apparatus comprising:

a circuit board including a substrate and a set of electrical traces (circuit board 4 with traces 5, see figure 1 and 8d, column 6, line 1-15);

a plurality of through holes in the substrate (hole 8, see figure 1 and 8d, column 6, line 1-15); and

a malleable, electrically conductive material filled within each of the through holes (conductive paste 7, see figure 1 and 8d, column 6, line 1-15).

Regarding claim 2, Tsukahara further discloses an electronic component directly coupled to the circuit board, the electronic component having a plurality of electrical contacts, each in physical contact with the electrically conductive material in a separate one of the through holes, (semiconductor element 1, see figure 1 and 8d).

Regarding claim 4, Tsukahara further discloses each of said plurality of electrical contacts is a solder ball, (bump 15 formed by metal ball, see figure 8d).

Regarding claim 26, Tsukahara further discloses at least one of the electrical traces are in electrical contact with the electrically conductive material in at least one of the through holes, (traces 5, see figure 1 and 8d, column 6, line 1-15).

Regarding claim 27, Tsukahara further discloses the circuit board includes an internal trace within the substrate, wherein the internal trace is in electrical contact with the electrically conductive material in at least one of the through holes at a location within the substrate, (see figure 3 and 4).

Regarding claim 28, Tsukahara further discloses each of said at least one of the

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through holes is defined by a separate surface of the substrate, wherein a conductive layer is disposed on said surface in each of said at least one of the through holes, and wherein the internal trace is in electrical contact with the conductive layer in each of said at least one of the through holes, (see figure 3 and 4).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukahara, US Patent No. 6,531,022, as applied to claims 1,2 and 4 above, and further in view of Buchoff et al., US Patent No. 3,971,610, hereafter, Buchoff.

Regarding claim 5, the applicant is claiming the electrically conductive material as elastomer. Though, Tsukahara does not explicitly disclosing the conductive paste as elastomer, the conductive paste has the elasticity to be displaced when the bump is forced into the holes.

Further, elastomer as a conductive element in the through hole, as disclosed by Buchoff is known in the art for maintaining good electrical contact.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Tsukahara with holes filled

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with conductive elastomer, as taught by Buchoff, apparently in order to maintain good electrical contact.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

6. Claims 6-7, 9-11, 13, 15, 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tsukahara and Buchoff, as applied to claims 1-2 and 4-5 above, and further in view of Credle et al., US Patent No. 5,340,947.

Regarding claim 6, though the combination of Tsukahara and Buchoff do not disclose the tapered through holes, such tapered through holes, as disclosed by Credle, are known in the art and are used depending upon specific situation. Tapered through holes are easy to drill by laser drill method and also will be convenient to fill the conductive material into the holes, in particular by screen-printing method, without any voids. If the thickness is large compared to the diameter, the taper may be provided from both the ends to fill the material without any void.

Therefore, it would have been obvious to one having ordinary skill in the art the time the invention was made to provide the combination structure of Tsukahara and Buchoff with taper through holes, as taught by Credle, in order to have the vias without any voids.

Regarding claims 7 and 11, the combination of Tsukahara, Buchoff and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the tapered through holes and a set of electrical traces.

Regarding claims 9 and 13, the combination of Tsukahara, Buchoff and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the solder balls that compresses the elastomer when the electronic component is coupled to the circuit board, see Tsukahara, figure 1 and 8d.

Regarding claims 10 and 15, the combination of Tsukahara, Buchoff and Credle discloses all the features of the claimed invention as applied to claims 1-2 and 4-6 above, including the conductive particles; see Buchoff, column 3, 18-45.

Regarding claims 29, the combination of Tsukahara, Buchoff and Credle further discloses at least one of the electrical traces is in electrical contact with the electrically conductive elastomer in at least one of the through holes, as applied to claim 26 above.

Regarding claims 30, 31, 32 and 33 the combination of Tsukahara, Buchoff and Credle further discloses an internal trace within the substrate, wherein the internal trace is in electrical contact with the electrically conductive elastomer in at least one of the through holes at a location within the substrate, as applied to claim 27 above.

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Regarding claim 34 the combination of Tsukahara, Buchoff and Credle further discloses the electronic component is coupled directly to the circuit board, see Tsukahara see figure 1 and 8d.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tsukahara, Buchoff and Credle as applied to claims 1-2, 4-7, 9-11 and 13 above, and further in view of Glenn, US Patent NO. 6,441,485.

The applicant is claiming a fastener to secure the electronic component to the circuit board.

Though, the combination of Tsukahara, Buchoff and Credle do not disclose a fastener to secure the electronic component to the circuit board, such fasteners are known in the art as disclosed by Glenn for mounting an electronic device on substrate without soldering.

Therefore, it would have been obvious to one having ordinary skill in the art the time the invention was made to provide the combination structure of Tsukahara, Buchoff and Credle with a fastener, as taught by Glenn, in order to secure the electronic component to the circuit board without soldering.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1,7 and 11 have been considered but are moot in view of the new ground(s) of rejection.



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Tsukahara discloses the structure with circuit board including a set of electrical traces.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Horiuchi et al., disclose an electronic device with metal bump of the electronic component inserted into the low melting point metal contained in the through holes, column 4, line 1-5.

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Viza et al., discloses a microelectronic assembly with the bump 26 with tip 34 inserted into the bonding agent into the via hole.

Appelt et al., disclose an electronic package with through hole filled with polymer and conductive composition.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (8:30 - 5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp  
July 27, 2003



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